PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2001-197279
(43)Date of publication of application : 19.07.2001

---

(51)Int.Cl.

H04N 1/32
H04L 12/56
H04L 23/00
H04N 1/00

---

(21)Application number : 2000-006472
(22)Date of filing : 14.01.2000

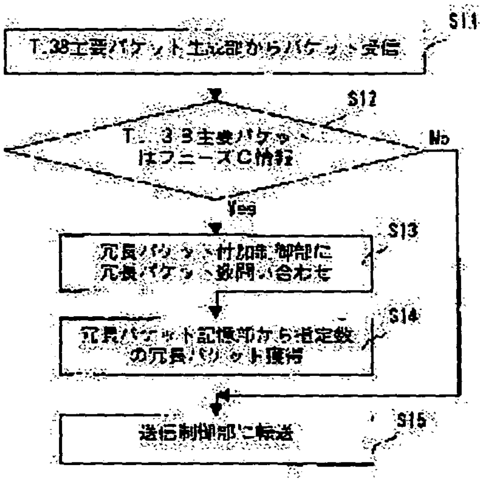
(71)Applicant : RICOH CO LTD
(72)Inventor : MORI KOICHI

---

(54) REAL TIME INTERNET FACSIMILE EQUIPMENT

(57)Abstract:

PROBLEM TO BE SOLVED: To provide real time Internet facsimile equipment which can set the number of additional redundant packets to attain communication of high reliability.
SOLUTION: The number of redundant packets which are transmitted when a UPD is used as a network transport can be optionally changed during communication, so that the communication is attained with high reliability. For example, the different numbers are set between the redundant packets of picture information transmission phases and those of phases other than the picture information transmission phases and the number of the latter redundant packets is set at zero.


S11
T.38主要パケット生成部からパケット受信
S12
T.38主要パケットはフェーズC情報
No
Yes
S13
冗長パケット付加制御部に冗長パケット数問い合わせ
S14
冗長パケット記憶部から指定数の冗長パケット獲得
S15
送信制御部に転送

LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer.So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] Real time type Internet facsimile apparatus characterized by enabling it to change arbitrarily the number of redundant packets transmitted in the real time type Internet facsimile apparatus which is connected to a computer network and transmits a facsimile picture with packet communication when using UDP as network transport during communication.

[Claim 2] Real time type Internet facsimile apparatus according to claim 1 characterized by setting the number of redundant packets of a drawing information transmitting phase, and the number of redundant packets in phases other than a drawing information transmitting phase as a different number, and making the number of redundant packets in phases other than a drawing information transmitting phase into zero.

[Claim 3] Real time type Internet facsimile apparatus according to claim 1 or 2 characterized by making it make the number of redundant packets increase when the RTN signal has been sent from the receiving side.

[Claim 4] Real time type Internet facsimile apparatus characterized by making it reduce the number of redundant packets when the signal of MCF has been sent from the receiving side.

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]
[The technical field to which invention belongs] this invention relates to the real time type Internet facsimile apparatus which transmits and receives fax information using UDP (User Datagram Protocol) with a packet communication network.

[0002]
[Description of the Prior Art] In recent years, communication system (henceforth "mailed type Internet facsimile communication system") which communicates facsimile drawing information is increasingly used using the E-mail exchanged on the Internet.

[0003] The technical content is prescribed about such communication system by RFC (Request For Comments) 2301-2306 published from the organization which is summarizing the technical content about the Internet called IETF (Internet Engineering Task Force).

[0004] However, in this mailed type Internet facsimile communication system, since transmitting-side facsimile apparatus and receiving-side facsimile apparatus do not necessarily communicate directly, the check of facsimile apparatus mutual communication capacity cannot carry out in instancy, but, for the reason, produces the situation where drawing information communication using the various functions (resolution, image-processing capacity, etc.) of facsimile apparatus cannot be performed.

[0005] Moreover, time is taken until a transmitting-side user is notified of a communication result, since the notice of a communication result cannot be performed in instancy, either, and the situation where management when needs, such as retransmission of message, arise is overdue is also produced.

[0006] Then, the real time type Internet facsimile communication system which realizes facsimile communication on real time through the Internet as facsimile communication system using the Internet is being proposed.

[0007] The detail of the proposal of this real time type Internet facsimile communication system is collected and released to ITU-T recommendation T.38.

[0008] In such real time type Internet facsimile communication system The transmitting-side real-time Internet facsimile apparatus High facsimile communication of real time nature can be performed between the receiving-side real-time Internet facsimile apparatus. Since the check of real-time Internet facsimile apparatus mutual communication capacity can carry out to real time, the transmitting-side real-time Internet facsimile apparatus Since a communication result is immediately obtained while being able to transmit the drawing information according to the communication capacity of the receiving-side real-time Internet facsimile apparatus, resending operation etc. can be performed quickly.

[0009]
[Problem(s) to be Solved by the Invention] The above-mentioned real time type Internet facsimile is equipment which performs the same document transmission as the conventional fax with IP packet communication on the Internet, and the procedure of the support of both TCP/UDP serving as an indispensable function, transmitting a redundant packet at the time of UDP use, and performing error recovery as transport is specified.

[0010] However, the operation of the redundant packet was not specified appropriately, but had caused the problem on communication (communicative cutting).

[0011] For example, drawing 6 is drawing having shown the composition of the UDP packet of four cases for the number of redundant packets, main messages with the header of the consecutive number 45 are set first, next, the transmitting packet of a four pieces before is appended as a redundant packet, and as shown in drawing 7 , error recovery at the time of drawing information transmission is performed.

[0012] Error recovery is carried out by the following 11th and the 13th packet attainment, although the 10th and the

12th UDP packet were canceled on the network and the main messages of the consecutive numbers 10 and 12 at that time became an error (state which does not reach a partner terminal) in drawing 7 .

[0013] However, there is a problem which causes the derangement on a protocol as follows only by adding a front packet simply in this way, and transmitting.

[0014] Drawing 4 shows an example of the communications protocol specified by advice T.38. If a TSI/DCS packet is lost on a network, although a receiving side RTifax will resend a DIS packet according to this, the redundant packet will also have DIS information.

[0015] Moreover, if the CFR packet from a receiving side is lost, although a transmitting side will resend a DCS packet, if the packet is lost, a receiving side resends a CFR packet.

[0016] However, although Reception RTifax transmits an MCF packet to the redundant packet after receiving an EOP packet with DIS information (it is unnecessary already in phase), the content of a redundant packet may have CFR and a DIS packet.

[0017] Thus, the error recovery by the redundant packet not only resends a very meaningless information element, but has the danger that the whole protocol will fail.

[0018] Moreover, especially the problem mentioned above becomes remarkable when a redundant packet is applied to the command sequence portion of advice T.30, and the solution method of this portion is especially important for it.

[0019] Moreover, also in a drawing information transceiver phase, if an UDP packet is canceled in a network, it will become degradation of drawing information and cancellation will occur frequently, there is a problem used as communication cutting and optimization of the number of redundant packets is needed.

[0020] Moreover, although it is satisfactory seemingly when communication is progressing normally, from a viewpoint of the load of the whole network, the unnecessary redundant packet may be transmitted and optimization of the number of redundant packets is needed.

[0021] Then, a setup of the number of redundant packets to add of this invention is enabled, and it aims at offering the real time type Internet facsimile apparatus which enabled it to perform reliable communication.

[0022]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, it is characterized by enabling it to perform reliable communication, as it connects with a computer network and invention concerning a claim 1 can change arbitrarily the number of redundant packets transmitted in the real time type Internet facsimile apparatus which transmits a facsimile picture with packet communication when using UDP as network transport during communication.

[0023] Invention concerning a claim 2 sets the number of redundant packets of a drawing information transmitting phase, and the number of redundant packets in phases other than a drawing information transmitting phase as a different number, by making the number of redundant packets in phases other than a drawing information transmitting phase into zero, is adding a redundant packet only to the phase C portion of advice T.30, and is characterized by preventing the danger of a breakdown of a protocol, and resending of meaningless information.

[0024] It is characterized by it increasing the number of redundant packets, when errors occur frequently by the receiving side, as invention concerning a claim 3 makes the number of redundant packets increase, when the RTN signal has been sent from the receiving side, and it strengthening an error recovery function, and enabling it to perform good communication.

[0025] Invention concerning a claim 4 is characterized by the ability to make [to make a transmitting packet small, when an error does not occur in a receiving side, as the number of redundant packets is reduced, when the signal of MCF has been sent from the receiving side and] the load of the whole network small.

[0026]

[Embodiments of the Invention] The form of operation of this invention is explained with reference to drawing. As shown in drawing 1 , the usual G3 fax is connected to ends, and there are some to which two equipments communicate with the so-called gateway type which communicates directly via a public network (PSTN) and the Internet only through the Internet except for G3 fax of ends like drawing 2 from drawing 1 in the form of real time type Internet facsimile communication.

[0027] Although drawing 1 and drawing 2 of the communications protocol on the Internet are the same and are prescribed by ITU-T recommendation T.38, in order to hold G3 communication of ends, by communication of the form of drawing 1 , the device on various protocols (advice T.30) is needed.

[0028] Then, it adds first that this invention is constituted so that it may become applicable to any form of drawing 1 and drawing 2 .

[0029] As composition of the equipment which added the communication facility (direct communication which went via the Internet) of drawing 2 to the usual G3 fax, the composition which shows drawing 3 , for example can be illustrated.

[0030] It is backed up with ROM2 in which the program of CPU1 which controls the whole system, and CPU1 concerned is stored in this drawing, RAM3 which makes a working area and a temporary storage region required for a program to operate, a dc-battery, etc., and has the timer control 5 grade which performs time management of SRAM4 which memorizes the information which should be guaranteed to power off, and the timer control (interruption) used by the whole system.

[0031] Moreover, compression and reproduction of drawing information are performed by CODEC6, and MH/MR/MMR etc. is used by facsimile.

[0032] Usually, drawing information is accumulated at a hard disk HD 8, and the hard disk HD 8 concerned is controlled by the hard disk controller HDC7.

[0033] And in performing a program, the soft target and the hard interface with a control unit are performed by control unit i/f9, and a user actually performs operation of transmission, registration, etc. by the control unit 10.

[0034] The soft target and the hard interface with a scanner 12 are performed by scanner i/f11 in reading drawing information with a scanner 12 and reading drawing information.

[0035] The soft target and the hard interface with a plotter 14 are performed by plotter i/f13 in performing printing of drawing information by the plotter 14, and printing drawing information.

[0036] CPU/ROM/RAM etc. is usually mounted in G3 communications control section 15, a hard target and the interface like software are taken a main board side (1-7), the exchange of drawing information etc. is performed, and the protocol according to T.advice 30 procedure is controlled.

[0037] Moreover, the network control section 16 takes an electric interface with PSTN, and G3 communications control section 15 enables it to communicate with G3FAX of the other party via PSTN.

[0038] CPU/ROM/RAM etc. is usually mounted, and the LAN communications control section 17 takes a hard target and the interface like software a main board side (1-7), performs the exchange of drawing information etc., and controls the protocol according to T.advice 38 procedure.

[0039] Moreover, protocol control for Internet access called an TCP/UDP/IP protocol is also performed here.

[0040] The LAN control section 18 takes an electric interface with LAN, and enables the LAN communications control section 17 to communicate with the real time type Internet facsimile of the other party via LAN.

[0041] Drawing 4 is an example of the communications protocol specified by advice T.38. RTifax [the facsimile of drawing 2] is written.

[0042] First, a transmitting side RTifax transmits and carries out the connection request of the connection-request packet to a receiving side RTifax, and thereby, a receiving side RTifax transmits a connection-confirm packet to a transmitting side RTifax, and checks call connection.

[0043] Since the communication path between a transmitting side RTifax and a receiving side RTifax is established, by this a receiving side RTifax While transmitting the signal (T30 IND:CED) corresponding to the predetermined tone signal CED (called station recognition signal) of ITU-T recommendation T.30 to a transmitting side RTifax It is a group 3 facsimile-transmission procedure signal following the signal (T30 IND:Flag) corresponding to the flag signal. The signal CSI for notifying the signal NSF for notifying the option transmission function in the end of a local, and the recognition signal in the end of a local, And the signal (V21 HDLC:NSF/CSI/DIS) corresponding to the signal DIS for notifying the standard transmission function in the end of a local is transmitted to a transmitting side RTifax one by one, respectively.

[0044] Thereby, since a transmitting side RTifax knows the recognition signal and transmission function of a receiving side RTifax, based on the notified transmission function, a transmission function, modem speed, etc. which are then used are set up.

[0045] Subsequently, following the signal (T30 IND:Flags) corresponding to a flag signal, a transmitting side RTifax is a group 3 facsimile-transmission procedure signal, and transmits the signal (V21 HDLC:TSI/DCS) corresponding to the signal DCS for notifying Signal TSI and the transmission function to be used for notifying the recognition signal in the end of a local to a receiving side RTifax, respectively.

[0046] Thereby, a receiving side RTifax will acquire the identification information of a partner terminal (transmitting side RTifax), and the transmission function then used, if a signal (V21 HDLC:TSI/DCS) is received.

[0047] And following the signal (T30 IND:Flags) corresponding to a flag signal, a receiving side RTifax is a group 3 facsimile-transmission procedure signal, and transmits the signal (V21 HDLC:CFR) corresponding to the signal CFR for notifying the purport which reception preparation completed to a transmitting side RTifax.

[0048] When transmitting preparation of drawing information is completed, thus, a transmitting side RTifax The signal (T30 IND:Speed) corresponding to the training (Training) signal for lithograph rhe NINGU of a modem is transmitted to a receiving side RTifax. then, the image data of transmitting drawing information -- plurality -- dividing -- each divided drawing information -- packet data (illustration -- V. "17 non ECM:Image data" -- a display --) It carries out and transmits to a receiving side RTifax.

[0049] And after ending transmission of drawing information, while transmitting the signal (T30 IND:Flags) corresponding to the flag signal to a receiving side RTifax, the signal (V21 HDLC:EOP) corresponding to the signal EOP showing the purport which is a group 3 facsimile procedure signal and ends drawing information transmission is transmitted to a receiving side RTifax.

[0050] If the packet which will shift to reception preparation of drawing information and will carry drawing information on the other hand if a receiving side RTifax receives a signal (T30 IND:Speed) is received, the division drawing information included in it is taken out one by one, the connected drawing information will be created and the drawing information will be accumulated to image storage equipment 9. Moreover, as a transmission backward signal after drawing information reception, since a signal (V21 HDLC:EOP) is received in this case, the purport which drawing information reception ends is checked.

[0051] And a receiving side RTifax transmits the signal (V21 HDLC:EOP) corresponding to the signal MCF showing the purport which is a group 3 facsimile procedure signal and reception of drawing information ended normally to a transmitting side RTifax following the signal (T30 IND:Flags) corresponding to the flag signal, when the receiving result of the drawing information at that time is good.

[0052] This recognizes that the transmitting side RTifax was normally received in drawing information by the receiving side RTifax. After this, following the signal (T30 IND:Flags) corresponding to the flag signal, a transmitting side RTifax is a group 3 facsimile procedure signal, and transmits the signal (V21 HDLC:DCN) corresponding to the signal DCN for ordering it circuit restoration to a receiving side RTifax.

[0053] ** [a receiving side's RTifax reception of a signal (T30 IND:Flags) and a signal (V21 HDLC:DCN) / end / drawing information reception operation / and / receiving side]

[0054] And finally, a transmitting side RTifax sends out the notice packet of cutting which requires the purport which cuts a communication path to a receiving side RTifax, and ends a series of communication operation.

[0055] Thus, transmission of the drawing information on a receiving side RTifax is made from a transmitting side RTifax.

[0056] Moreover, drawing 5 is drawing showing the protocol stack in the case of exchanging a fax picture by advice T.38.

[0057] T.advice 30 protocol -- PSTN (telephone line), such as a modem and a network control unit, -- it turns, PSTN access is realized via a network device, and IP realizes network access via the network driver of LAN (Ethernet etc.) H.advice 323 call control procedure gives the procedure of the connection request and response packet of drawing 4 , or the notice packet of cutting.

[0058] And a protocol is usually mounted as software and is written in ROM2.

[0059] Drawing 6 shows the structure of the UDP packet containing a redundant packet, and drawing 7 shows typically the error recovery at the time of the drawing information transmission performed by it.

[0060] The number of redundant packets shown by drawing 6 and drawing 7 is four pieces, main messages with the header (contained in an UDP packet in fact) of the consecutive number 45 are set first, and, next, the transmitting packet (what was previously transmitted as a main message) of a four pieces before is appended as a redundant packet.

[0061] Therefore, the packet of the consecutive number 46 is set to the UDP packet which transmits to a degree as a main message, and the packet to 42-45 will carry out a redundant packet, and will be appended.

[0062] Although the 10th and the 12th UDP packet were canceled on the network and the main messages of the consecutive numbers 10 and 12 at that time became an error (state which does not reach a partner terminal) in drawing 7 , error recovery is carried out by the following 11th and 13th packet attainment.

[0063] In such composition, while communicating the number of redundant packets transmitted when using UDP as network transport, the case where a change is arbitrarily made possible is explained with reference to drawing 8 .

[0064] First, the transmission-control directions section starts by transmitting operation of a user (Step S1), and while making the information based on advice T.30 at T.30 signal / drawing information generation section generate (Step S2), the number of redundant packets (the example of drawing 7 four pieces) is notified to a redundant packet addition control section (Step S3).

[0065] And the information generated in T.30 signal / drawing information generation section is sent to the T.38 main packet generation section which forms a part of UDP packet, is changed into the message format based on advice T.38 (Step S4), and is sent to the T.38UDP packet generation section.

[0066] In addition, since this main packet turns into a redundant packet of the following UDP packet, it is sent also to the redundant packet storage section (Step S5).

[0067] And in order that the T.38UDP packet generation section may generate a final transmitting packet, it asks a redundant packet addition control section the number of redundant packets, obtains a required number of packets from the redundant packet storage section, adds a redundant packet, and generates an UDP packet (Step S6).

[0068] Thus, the generated T.38UDP packet is passed to the network transmission-control section, is controlled by the protocol stack of UDP/IP, and performs transmission to a network (Step S7).

[0069] By the way, the number of redundant packets can be arbitrarily changed now during communication because the transmission-control directions section notifies the number of redundant packets to a redundant packet addition control section suitably according to a transmitting phase during the above-mentioned processing (change).

[0070] Of course, it is possible not only the change under communication but to set the number of redundant packets as a suitable value by sending out the Ping command for example, before communication, and measuring the time to the response message.

[0071] Moreover, as shown in drawing 9 , the T.38UDP packet generation section itself analyzes a protocol phase, and, in other than the phase C of advice T.30 (drawing information transfer phase), controlling not to perform redundant packet addition is also possible.

[0072] In addition, drawing 9 is the flow chart which showed operation of the T.38UDP packet generation section in drawing 8 .

[0073] That is, if main packets are received from the T.38 main packet generation section (Step S11), the existence of phase C information will be judged (Step S12).

[0074] And in order to generate a transmitting packet as mentioned above when there is phase C information, the number of redundant packets is asked to a redundant packet addition control section (Step S13), a required number of packets are obtained from the redundant packet storage section, a redundant packet is added, and an UDP packet is generated (Step S14).

[0075] The T.38UDP packet generated by this is passed to the network transmission-control section, is controlled by the protocol stack of UDP/IP, and performs transmission to a network (Step S15).

[0076] It can control by this to add a redundant packet only to the phase C portion of advice T.30, and it becomes possible to prevent the danger of a breakdown of a protocol, and resending of meaningless information.

[0077] In addition, you may make it increase the number of redundant packets added when the signal of RTN (Retrain Negative) has been sent from the receiving side, as shown in drawing 10 .

[0078] As for the information on conditional branching of the existence of the RTN signal reception response in the drawing 10 concerned, the transmission-control directions section in drawing 8 shall set up drawing 10 with the flow chart equivalent to drawing 9 .

[0079] A RTN signal is a signal which shows what reception of the page went wrong when errors occur frequently by the receiving side, it usually returns to the phase B of advice T.30, and the down shift of the transmission speed is carried out.

[0080] In communication of the form shown in drawing 2 , the circuit (Internet) situation at the time of UDP transport use is bad, and when loss of a packet occurred frequently, and the RTN signal concerned was transmitted, it said in the example of drawing 7 and five continuous UDP packets are lost, error recovery of the one packet is not carried out, for example.

[0081] Moreover, with the form shown in drawing 1 , a RTN signal is further transmitted also according to the telephone-line situation between a receiving side Gateway and receiving G3FAX.

[0082] Although it is effective when the down shift of modem transmission speed has the cause of an error at a telephone-line side in the case of the form shown in drawing 1 , when the cause of an error is in UDP transport, the down shift concerned will become that meaningless.

[0083] Then, in such a case, with the flow chart shown in drawing 10 , a redundant packet is added by the information transmission of those other than Phase C like the case where it is shown in drawing 9 .

[0084] On the other hand, when the reception response is being carried out by the protocol phase at the RTN signal, while increasing the number of redundant packets obtained from the redundant packet addition control section and notifying the number, a redundant packet is gained from the redundant packet storage section.

[0085] That is, if main packets are received from the T.38 main packet generation section in drawing 10 (Step S21), the existence of phase C information will be judged (Step S22).

[0086] And when there is phase C information, in order to generate a transmitting packet, the number of redundant packets is asked to a redundant packet addition control section (Step S23), and the existence of a RTN signal reception response is judged (Step S24).

[0087] Since error recovery was not fully performed when there was RTN signal response reception at this time, it notifies increasing and updating the number of packets added to a redundant packet control section (Step S25).

[0088] And the redundant packet of this number is read from the redundant packet storage section, it adds to main

packets, and an UDP packet is generated (Step S26).
[0089] The T.38UDP packet generated by this is passed to the network transmission-control section, is controlled by the protocol stack of UDP/IP, and performs transmission to a network (Step S27).
[0090] On the other hand, at Step S24, since change of the number of redundant packets to add is unnecessary when there is no RTN signal reception response, it progresses to Step S26 and Step S27 as it is.
[0091] Moreover, in not being phase C information in judgment at Step S22, it progresses to Step S27 as it is.
[0092] The possibility of error recovery becomes large by this, and when a transmitting error can be avoided and errors occur frequently by the receiving side, the number of redundant packets is increased, an error recovery function is strengthened, and it becomes possible to perform good communication.
[0093] It is possible to, reduce the number of redundant packets on the other hand, by the existence of the MCF (Message Confirm) signal reception response which is a reception success signal, as shown in drawing 11 , when there are many added redundant packets. In addition, drawing 11 is a flow chart equivalent to drawing 10 .
[0094] That is, if main packets are received from the T.38 main packet generation section in drawing 11 (Step S31), the existence of phase C information will be judged (Step S32).
[0095] And when there is phase C information, in order to generate a transmitting packet, the number of redundant packets is asked to a redundant packet addition control section (Step S33), and the existence of an MCF signal reception response is judged (Step S34).
[0096] Since error recovery is fully performed when there is MCF signal response reception at this time, it notifies reducing and updating the number of packets added to a redundant packet control section (Step S35).
[0097] And the redundant packet of this number is read from the redundant packet storage section, it adds to main packets, and an UDP packet is generated (Step S36).
[0098] The T.38UDP packet generated by this is passed to the network transmission-control section, is controlled by the protocol stack of UDP/IP, and performs transmission to a network (Step S37).
[0099] On the other hand, at Step S34, since change of the number of redundant packets to add is unnecessary when there is no MCF signal reception response, it progresses to Step S36 and Step S37 as it is.
[0100] Moreover, in not being phase C information in judgment at Step S32, it progresses to Step S37 as it is.
[0101] Thus, reduction of the number of redundant packets means making a T.38UDP packet small, and has the effect which lowers the network load of the whole Internet.
[0102] In addition, although not illustrated, it cannot be overemphasized that the minimum of the number of redundant packets is "zero."
[0103]
[Effect of the Invention] Since a setup of the number of redundant packets was arbitrarily enabled during communication according to invention concerning a claim 1 as explained above, it becomes possible to optimize the number of redundant packets, and communicative reliability improves.
[0104] According to invention concerning a claim 2, by controlling to add a redundant packet only to the phase C portion of advice T.30, the danger of a breakdown of a protocol and resending of meaningless information can be prevented, and communicative reliability improves.
[0105] Since according to invention concerning a claim 3 the number of redundant packets was increased when errors occurred frequently by the receiving side, an error recovery function can be strengthened, good communication can be performed now, and communicative reliability improves.
[0106] Since according to invention concerning a claim 4 the number of redundant packets is reduced and it was made to make a transmitting packet small when an error did not occur in a receiving side, it becomes possible to lower the load of the whole network.

[Translation done.]

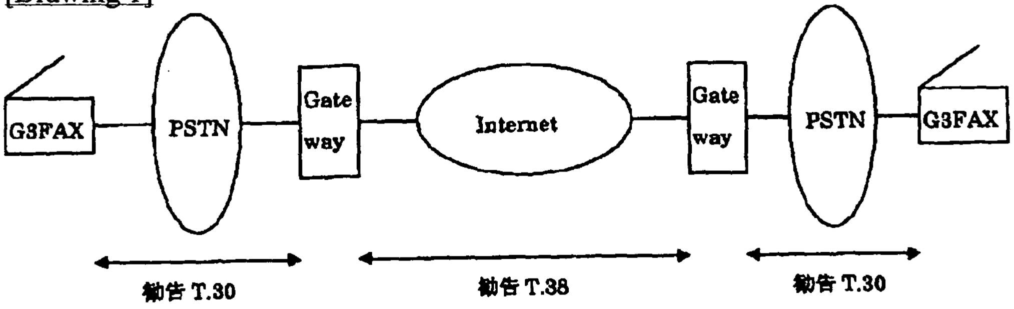
* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

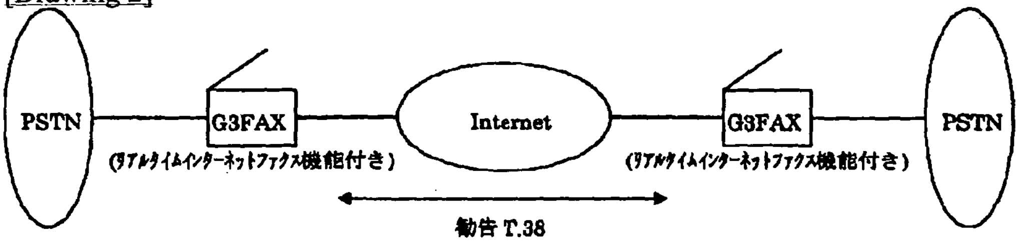
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

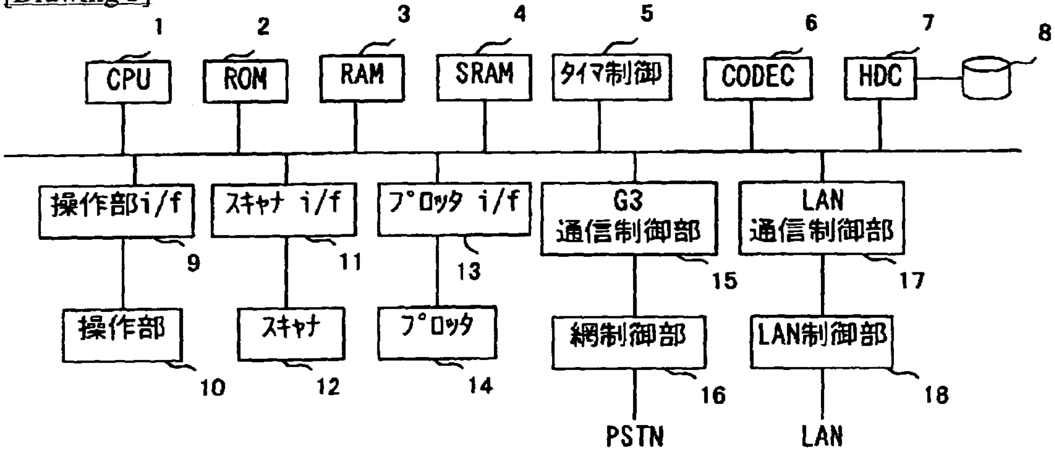
[Drawing 1]


G3FAX
PSTN
Gate way
Internet
Gate way
PSTN
G3FAX
勧告 T.30
勧告 T.38
勧告 T.30

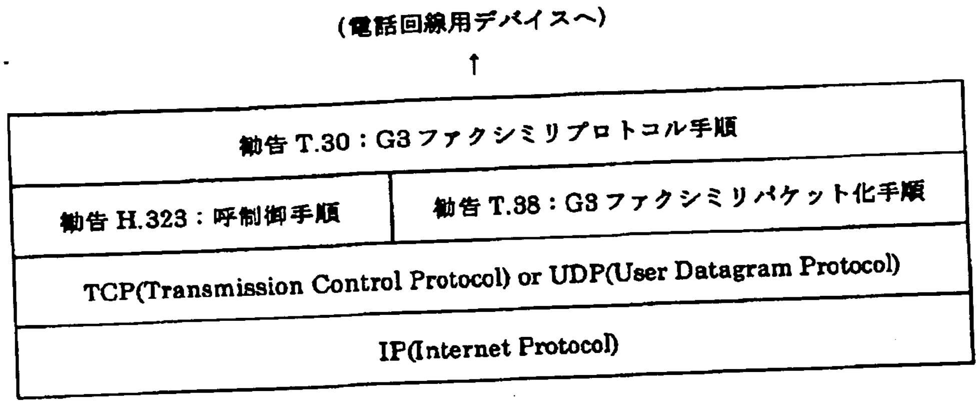
[Drawing 2]


PSTN
G3FAX
(リアルタイムインターネットファクス機能付き)
Internet
G3FAX
(リアルタイムインターネットファクス機能付き)
PSTN
勧告 T.38

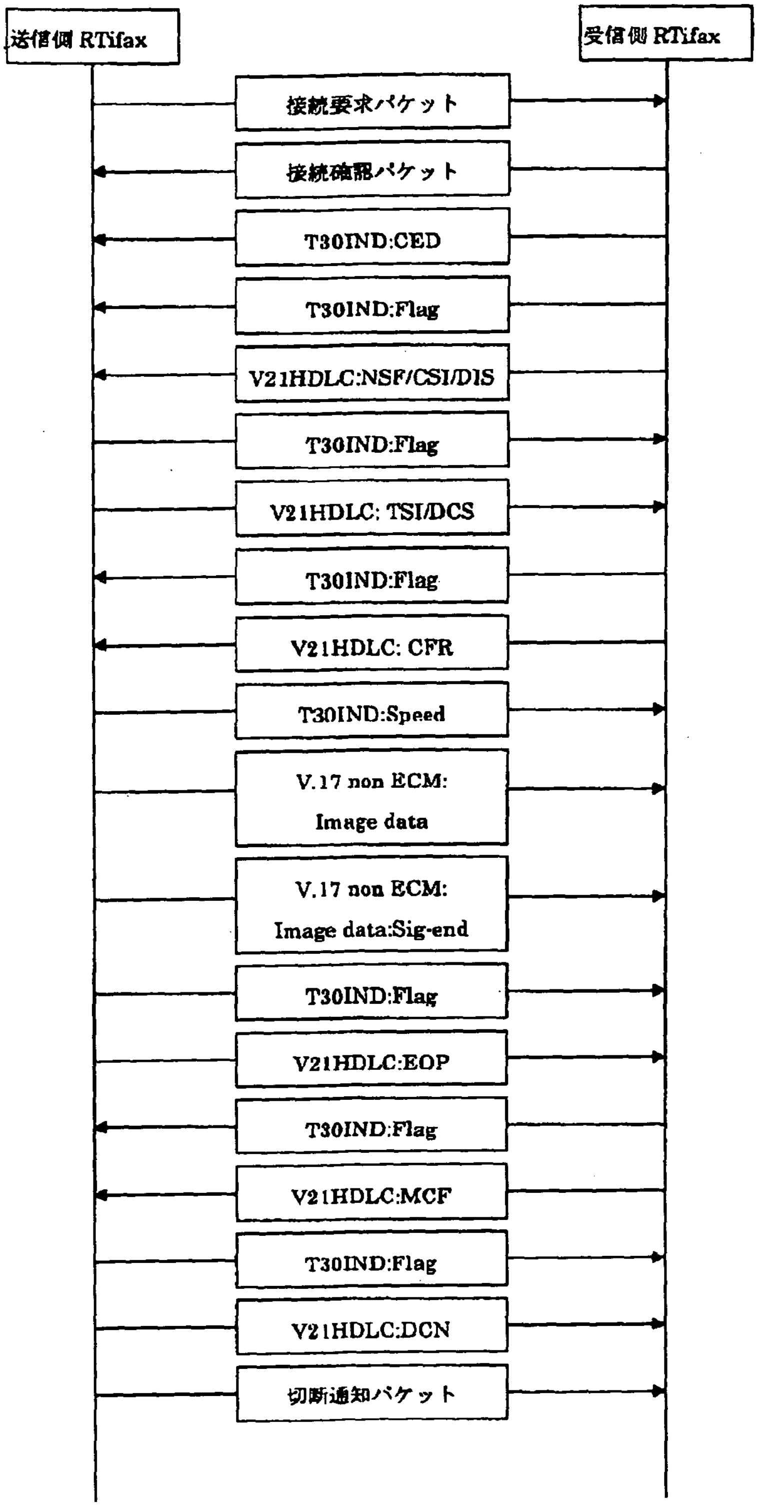
[Drawing 3]


1
CPU
2
ROM
3
RAM
4
SRAM
5
タイマ制御
6
CODEC
7
HDC
8
操作部i/f
9
スキャナ i/f
11
プロッタ i/f
13
G3 通信制御部
15
LAN 通信制御部
17
操作部
10
スキャナ
12
プロッタ
14
網制御部
16
LAN制御部
18
PSTN
LAN

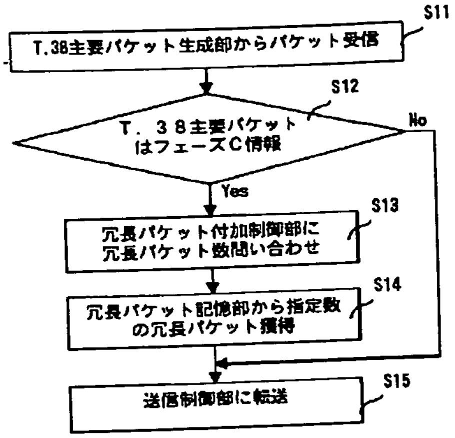
[Drawing 5]


（電話回線用デバイスへ）
勧告 T.30：G3ファクシミリプロトコル手順
勧告 H.323：呼制御手順
勧告 T.38：G3ファクシミリパケット化手順
TCP(Transmission Control Protocol) or UDP(User Datagram Protocol)
IP(Internet Protocol)

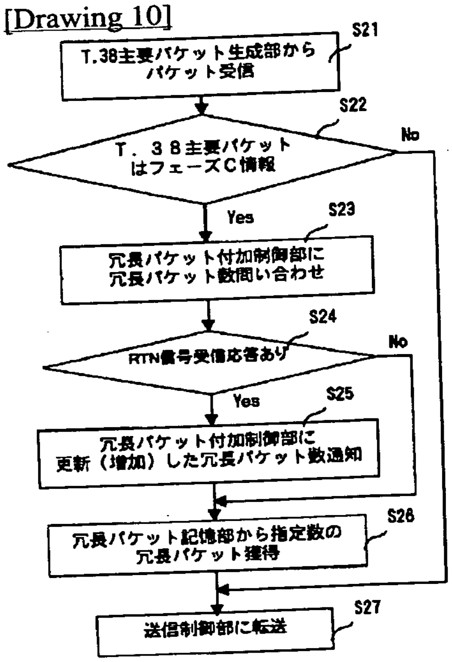
[Drawing 4]


送信側 RTifax
受信側 RTifax
接続要求パケット
接続確認パケット
T30IND:CED
T30IND:Flag
V21HDLC:NSF/CSI/DIS
T30IND:Flag
V21HDLC: TSI/DCS
T30IND:Flag
V21HDLC: CFR
T30IND:Speed
V.17 non ECM:
Image data
V.17 non ECM:
Image data:Sig-end
T30IND:Flag
V21HDLC:EOP
T30IND:Flag
V21HDLC:MCF
T30IND:Flag
V21HDLC:DCN
切断通知パケット

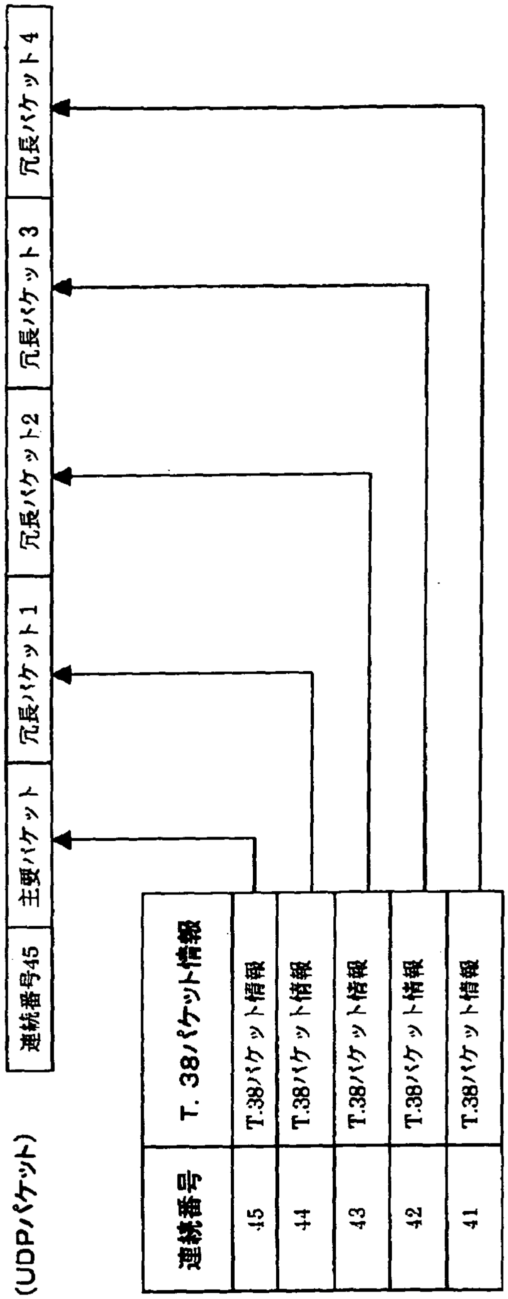
[Drawing 9]


S11
T.38主要パケット生成部からパケット受信
S12
T．３８主要パケット
はフェーズC情報
No
Yes
S13
冗長パケット付加制御部に
冗長パケット数問い合わせ
S14
冗長パケット記憶部から指定数
の冗長パケット獲得
S15
送信制御部に転送

[Drawing 10]

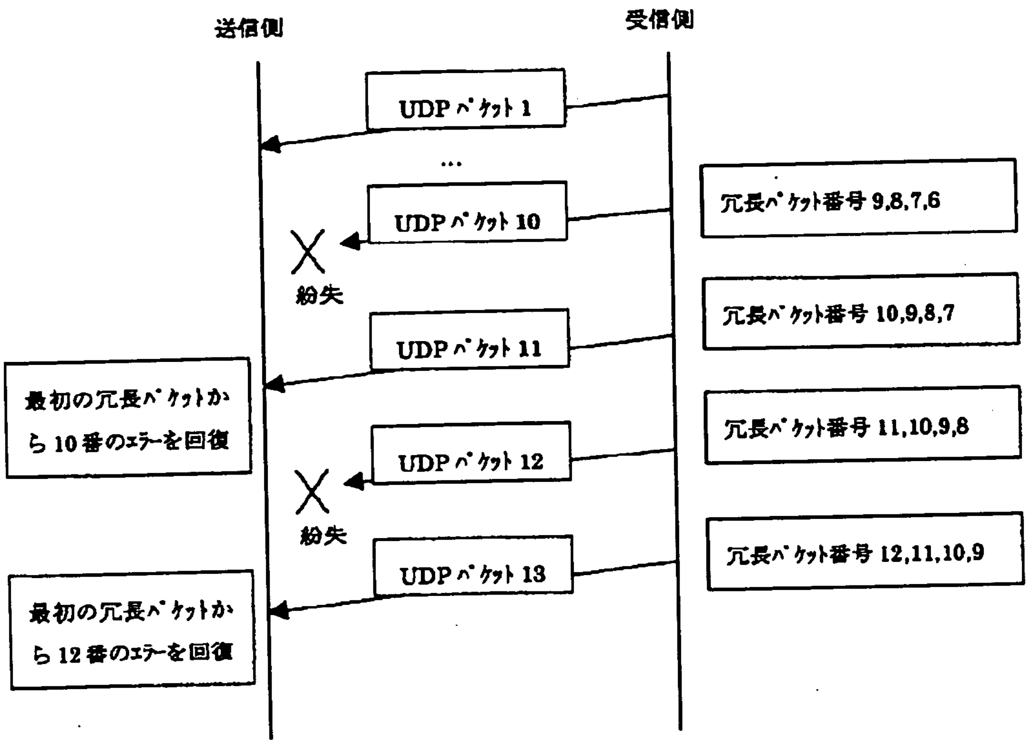

S21
T.38主要パケット生成部から
パケット受信
S22
T．３８主要パケット
はフェーズC情報
No
Yes
S23
冗長パケット付加制御部に
冗長パケット数問い合わせ
S24
RTN信号受信応答あり
No
Yes
S25
冗長パケット付加制御部に
更新（増加）した冗長パケット数通知
S26
冗長パケット記憶部から指定数の
冗長パケット獲得
S27
送信制御部に転送

[Drawing 6]

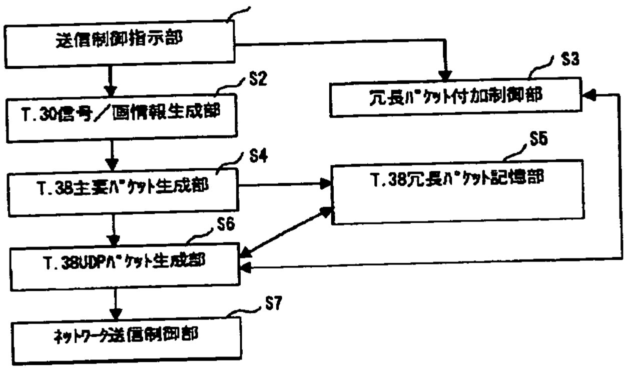

(UDPパケット)
連続番号45
主要パケット
冗長パケット1
冗長パケット2
冗長パケット3
冗長パケット4

連続番号	T．38パケット情報
45	T.38パケット情報
44	T.38パケット情報
43	T.38パケット情報
42	T.38パケット情報
41	T.38パケット情報

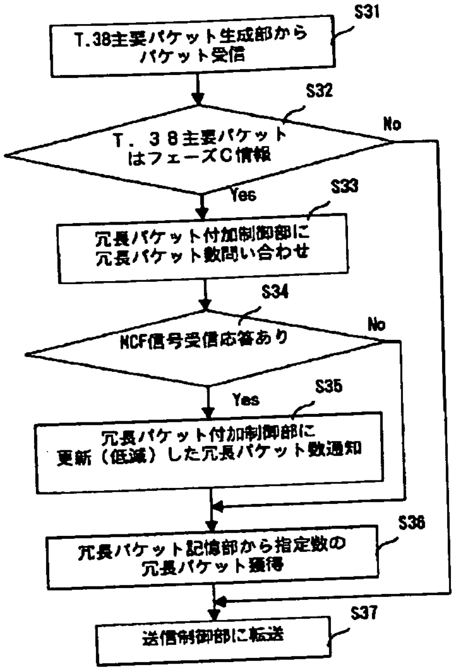
[Drawing 7]


送信側
受信側
UDPﾊﾟｹｯﾄ 1
…
UDPﾊﾟｹｯﾄ 10
冗長ﾊﾟｹｯﾄ番号 9,8,7,6
紛失
UDPﾊﾟｹｯﾄ 11
冗長ﾊﾟｹｯﾄ番号 10,9,8,7
最初の冗長ﾊﾟｹｯﾄから 10番のｴﾗｰを回復
UDPﾊﾟｹｯﾄ 12
冗長ﾊﾟｹｯﾄ番号 11,10,9,8
紛失
UDPﾊﾟｹｯﾄ 13
冗長ﾊﾟｹｯﾄ番号 12,11,10,9
最初の冗長ﾊﾟｹｯﾄから 12番のｴﾗｰを回復

[Drawing 8]


S1
送信制御指示部
S2
T.30信号／画情報生成部
S3
冗長ﾊﾟｹｯﾄ付加制御部
S4
T.38主要ﾊﾟｹｯﾄ生成部
S5
T.38冗長ﾊﾟｹｯﾄ記憶部
S6
T.38UDPﾊﾟｹｯﾄ生成部
S7
ﾈｯﾄﾜｰｸ送信制御部

[Drawing 11]


S31
T.38主要パケット生成部から
パケット受信
S32
T．３８主要パケット
はフェーズC情報
No
Yes
S33
冗長パケット付加制御部に
冗長パケット数問い合わせ
S34
NCF信号受信応答あり
No
Yes
S35
冗長パケット付加制御部に
更新（低減）した冗長パケット数通知
S36
冗長パケット記憶部から指定数の
冗長パケット獲得
S37
送信制御部に転送

[Translation done.]